

## REMARKS

Claims 10 and 15 are rejected under 35 U.S.C. 112 second paragraph as being indefinite. Specifically, the Examiner deems the following phrase in Claims 10 and 15 to be unclear: "photodetectors are . . . spaced at an interval corresponding to  $\frac{1}{2}$  said predetermined pitch of the slits." The Examiner required clarification as to whether this means that the gap between PD1 and PD3 in Fig. 1 is one half of the pitch of the slit (one half P).

The above recited phrase in Claims 10 and 15 does not mean that there is a half pitch gap between PD1 and PD3 in Fig. 1. Instead, the phrase in Claims 10 and 15 means that the photodetectors are of such size as shown and arranged in Fig. 1 of the present application. In order to detect the relative positions of the photodetectors and of the slits, it is desirable for the outputs of the photodetectors compared to be 180 degrees out of phase when illuminated through the slits. As a practical matter in semiconductor manufacturing, there will be a small gap between any two adjacent photodetectors. This is the case in the present application as well as in Ebina. This gap is in the range of several up to about 10 microns. In other words, each of the photodetectors in claims 10 and 15 plus half of the width of the gap is of dimensions of one half ( $\frac{1}{2}$ ) P or pitch in the direction of the relative motion with respect to the slit. This will result in the outputs of the photodetectors compared to be 180 degrees out of phase when illuminated through the slits. PD1 and PD3 are placed next to each other as shown in Fig. 1. While there is a gap between them, this gap is typically small compared to the dimensions of PD1 and PD3 in the direction of relative motion.

Terminology quoted above and objected to by the examiner in claims 10 and 15 can be found in the claims of U.S. Patent 4,654,525 to Ebina et al. See, for example, Claim 1 lines 29-30 in column 6 of the Ebina patent, referring to Fig. 2 of the Ebina patent. Therefore the phrase objected to by the Examiner is believed to be clear in meaning and is not indefinite under 35 U.S.C. 112, as evidenced by the same terminology in the issued claims of the Ebina patent.

Claims 1, 2, 4-6, 9 and 11-14 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,981,936 to Fujiie. Claims 11 and 12 have been cancelled. The rejection is traversed in so far as it is applied to the remaining claims as amended.

As amended, Claim 1 clearly states that the comparator directly compares the first and second amplified diversions of the output of the first and second photodetectors without negative

feedback. As noted in the present application on page 2 paragraph 5, using an operational amplifier with negative feedback can render the detection circuit less stable and it is desirable to provide an improved photo detection system without negative feedback. Claim 1 has been amended so that the comparator directly compares the first and second amplified versions of the outputs of the first and second photodetectors without negative feedback. The outputs of the first and second photodetectors are first amplified by means of the current mirror arrangements set forth in Claim 1 before they are directly compared by the comparator. This is very different from the arrangement taught by Fujiie.

In Fujiie, the amplified current from the photodetector PD1, after amplification by the current mirror, is first applied to an operational amplifier OP1 before it is applied to differential amplifier OP3. Operational amplifier OP1 has a negative feedback loop including a resistor R1. As noted above, this negative feedback action can cause instability and may be undesirable. As noted in the present application on page 2 paragraph 6, describing an advantage of an embodiment of the invention, "this detection apparatus includes no feedback path for processing the output of at least one of the photodetectors and is therefore more stable, unlike those employing operational amplifiers with feedback for processing the outputs of all the photodetectors."

It is believed to be well settled that in order for a reference to anticipate a claim, there must be identity of elements between those of the reference and those of the claim. In view of the above difference, Fujiie clearly fails this test. Even though the current mirror circuit of Fujiie may not include feedback, the circuit that is used for processing the output from the current mirror clearly includes negative feedback.

Furthermore, in view of the vast differences between the construction of the circuits in Claim 1 on one hand and Fujiie on the other, it is further believed that there is no reason or motivation for modifying the circuit in Fujiie to arrive at the apparatus of Claim 1. Claim 1 is therefore believed to be allowable.

For reasons similar to those explained above for Claim 1, amended Claim 4 is likewise believed to be allowable.

Claims 2, 5, 6, 9, 13, 14 are believed to be allowable since they depend from allowable claims.

Claims 3, 7 and 8 are rejected under 35 U.S.C. 103a as being unpatentable over Fujiie in

view of U.S. Patent 5,982,206 to Tachio et al. The rejection is respectfully traversed.

Claims 3, 7 and 8 are believed to be allowable since they depend from allowable claims. As noted above, Fujiie fails to teach or suggest independent Claims 1 and 4. Since Tachio likewise fails to remedy the deficiencies of Fujiie as described above, Tachio likewise fails to teach or suggest the independent Claims 1 and 4. Therefore the combination of Fujiie and Tachio also fails to teach or suggest independent Claims 1 and 4, and all claims dependent thereon, including claims 3, 7 and 8.

Claims 10 and 15 are rejected under 35 U.S.C. 103a as being unpatentable over U.S. Patent 4,654,525 to Ebina in view of Fujiie. The rejection is respectfully traversed.

Ebina teaches a photodetector circuit where the photodetectors are spaced at an interval of one quarter ( $1/4$ ) pitch rather than half pitch in the claims 10 and 15. Arranging the photodetectors at half pitch is clearly very different from that of Ebina at quarter pitch. Thus for example, the two photodetectors whose outputs are compared in Claims 10 and 15 are not separated by any other photodetector, whereas in Ebina, the two photodetectors whose outputs are compared are spaced apart by another photodetector. Thus the outputs of photodetectors 301 and 303 are compared and the outputs of photodetectors 302 and 304 are compared. In contrast, the photodetectors compared in the rejected claims are placed next to each other without any other photodetector in between, such as PD1 and PD3. In view of the differences between the configuration of the photodetectors in Claims 10 and 15 on one hand and those of Ebina on the other, it is believed that there is no reason or motivation for those of ordinary skill in the art to modify Ebina in order to arrive at the configuration of Claims 10 and 15. The reason given by the examiner, namely "in view of improving signal to noise ratio" is not supported by the disclosure in Ebina, and the examiner has failed to give any factual support for this reasoning. The reason given therefore appears to be based on subjective belief and unknown authority and without foundation. There simply is no indication or hint, factual or otherwise, why those of ordinary skill in the art would modify Ebina to arrive at the features of claims 7 and 15. If the examiner maintains otherwise, it is respectfully requested that the examiner explain in detail, with factual support, why this is the case.

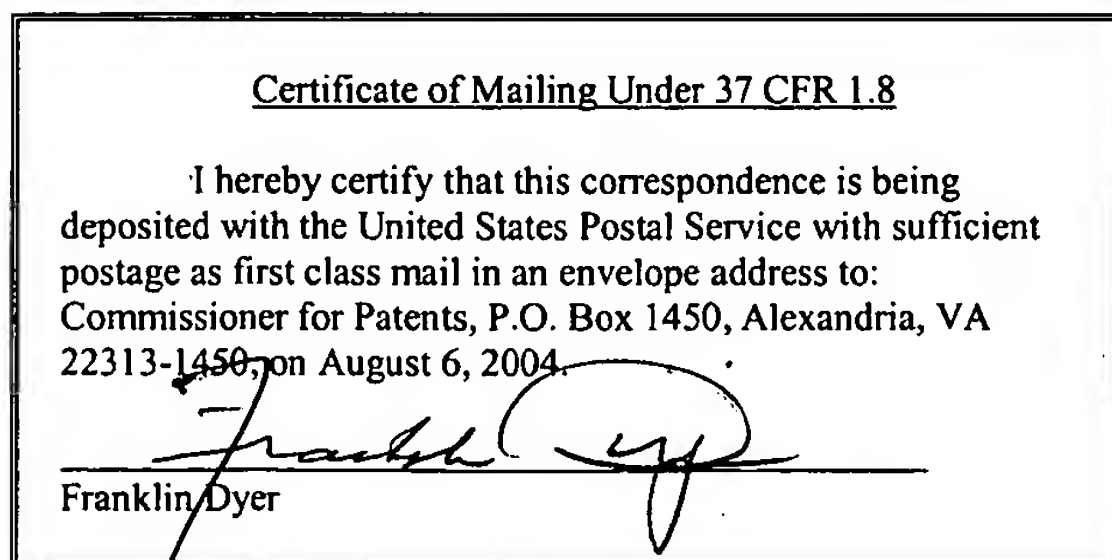
The court has frequently cautioned against a hind-sight based analysis as set forth in the case in *In re Sang Su Lee*, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. Jan. 2002). In such case, the Federal Circuit, quoted *In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617

(Fed. Cir. 1999) as follows: "Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references." The Federal Circuit went on to state that "The need for specificity pervades this authority . . . . The Examiner's conclusory statements . . . do not adequately address the issue of motivation to combine. This factual question of motivation is material to patentability, and could not be resolved on subjective belief and unknown authority." The court's statement concerning "rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references combination of references" applies equally to the situation here regarding treating a feature as obvious in view of a reference despite significant differences between them.

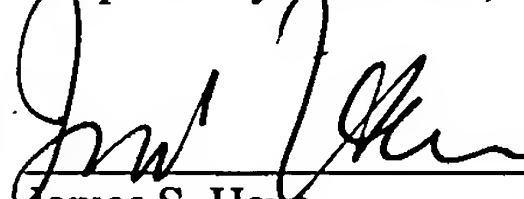
Claims 10 and 15 are also believed to be allowable since they depend from allowable Claims 1 and 4. Since Ebina also fails to remedy the deficiencies of Fujiie described above, Ebina likewise fails to teach or suggest the independent Claims 1 and 4. Therefore the combination of Fujiie and Ebina also fails to teach or suggest independent Claims 1 and 4, and all claims dependent thereon, including claims 10 and 15.

New Claim 16 and 17 have been added to more adequately claim the invention. These two claims are likewise believed to be allowable for reasons explained above.

Claims 1-10 and 13-17 are presently pending in the application. Reconsideration of the rejections is respectfully requested and an early indication of the allowability of all the claims is earnestly solicited.



Respectfully submitted,

  
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8/6/04  
Date